

Detailed Methods for Characterization and Monitoring of Coral Reef Ecosystems and Associated Biological Communities

There are four complementary components to our field methodology. The first is a 25m long belt transect used to quantify fish species' size and abundance. This component is particularly effective for sampling multiple habitat types such as mangroves where the diver is able to swim adjacent to the prop roots, or reefs, where it enables the diver to see what is on the distal side of structures. Additionally, high visibility is not as essential as with the second component, a point-count. The point-count methodology has historically been used in the Virgin Islands and Florida Keys for examination of reef fish communities. In previous missions the point count was added to enable comparison with historical record. Due to personnel limitations the point-count method is only used in the mid-shelf reef habitats in St. John, USVI. Fish data collected from both of these two components is related back to large-scale benthic habitat information to identify spatial patterns in community structure. The third component of the methodology involves taking detailed habitat measurements along the belt transect. These measurements can later be correlated to the fish data in order to gain insight into small-scale fish-habitat relationships. Finally, the fourth component is measuring water quality parameters at each site.

I. Belt Transect Fish Census:

The belt transect diver obtains a random compass heading prior to entering the water and records the compass bearing (0-360°) on the data sheet. This compass heading should allow the diver to stay on the specific habitat type they are intending to census without crossing over into a neighboring habitat. On site, no attempt to avoid structural features within a habitat such as a pile of conch shells, a sand patch or a tire in a seagrass or sand area should be made as these features affect fish communities and are "real" features of the habitats. Visibility at each site must be sufficient to allow for identification of fish at a minimum of 2m away. Once reasonable visibility is ascertained, the diver attaches a tape measure to the substrate and allows it to roll out as progress is made along the chosen compass heading for a distance of 25m. The transect should take 15 minutes regardless of habitat type or number of animals present. This allows more mobile animals the opportunity to swim through the transect, and standardizes the samples collected to allow for comparisons. As the tape rolls out at a relatively constant speed, the diver records all fish species to the lowest taxonomic level possible that come within 2m of either side of the transect. Each survey is 100m² in area (25m length X 4m width). To decrease the total time spent writing, four letter codes are used that consist of the first two letters of the genus name followed by the first two letters of the species name. In the rare case that two species have the same four-letter code, letters are added to the species name until a difference occurs. If the fish can only be identified to the family or genus level then this is all that is recorded. If not even the family can be identified then no entry is necessary. The number of individuals per species is tallied in 5cm size class increments up to 35cm using visual estimation of fork length. If an individual is greater than 35cm, then an estimate of the actual fork length is recorded. Although the habitat should not be altered in any manner by lifting or moving structure, the observer should record fish seen in holes, under ledges and in the water column. To identify, enumerate, or locate new individuals a diver may move off the centerline of the transect as long as they stay within the 4m transect width and do not look back along area already covered. The diver is allowed to look forward toward the end of the transect for the distance left along the transect (i.e. if the diver is at meter 15, he can look 10 meters distant, but if he is at meter 23, he can only look 2 meters ahead). In mangrove areas the diver swims close to the prop roots and looks as far into

